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# THE MANUFACTURE AND USE OF PEANUT BUTTER

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## DEVELOPMENT OF THE PEANUT-BUTTER INDUSTRY.

THE commercial production of peanut butter has in recent years developed to large proportions. One manufacturer alone produced about 6,000,000 pounds in 1919. There are dozens of large factories and hundreds of smaller ones. All told, peanut butter is probably the most important peanut product manufactured in the United States. The peanuts used in making this butter in 1919 probably totaled six or eight million bushels, being at least five times the quantity used for this purpose in 1907.

In the early days of its manufacture peanut butter was sold largely as a food for invalids, but it soon outgrew this limited use. Now it is considered a standard luncheon delicacy, especially in the making of sandwiches, though it is used in various other ways.

## FOOD VALUE OF PEANUT BUTTER.

Peanut butter is a wholesome and highly nutritious food, having a much greater food value than round steak. Jaffa, in Farmers' Bulletin 332, entitled "Nuts and Their Uses as Food," gives the following analyses of peanut butter and round steak: *Peanut butter.*—Water, 2.1 per cent; protein, 29.3 per cent; fat, 46.5 per cent; carbohydrates, 17.1 per cent; ash, 5 per cent; fuel value, 2,825 calories per pound. *Round steak.*—Water, 65.5 per cent; protein, 19.8 per cent; fat, 13.6 per cent; carbohydrates, none; ash, 1.1 per cent; fuel value, 950 calories per pound.

These figures show that peanut butter contains one and a half times as much protein, more than three times as much fat, nearly five times as much ash, and three times as much fuel value as round steak. In addition to this, peanut butter contains 17.1 per cent of carbohydrates, while steak contains none. Pound for pound, peanut butter has a much greater food value than round steak, though it sells for a lower price.



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## COMMERCIAL MANUFACTURE OF PEANUT BUTTER.

In the manufacture of peanut butter only the best materials should be used. High-grade butter can not be made from inferior nuts. On the other hand, the best stock will not make good butter unless all the work of converting it into a high-grade product is carried on in the proper way and under sanitary conditions.

### THE STOCK.

Most peanut-butter manufacturers secure their peanuts from the cleaning and shelling factories, where they have already undergone the cleaning, shelling, and grading processes. This is generally considered the better method, although a few factories prefer to secure farmers' stock peanuts and do their own cleaning and shelling. Where the manufacturer secures the uncleaned unshelled peanuts, he should do the cleaning and shelling in a separate building, to prevent the dirt incident to the cleaning from getting into the butter.

The varieties of peanuts most commonly used in the manufacture of peanut butter are the Virginia Bunch, Virginia Runner, and Spanish. Some factories use the Virginia varieties alone, while others use a mixture of Virginia Runner or Virginia Bunch and Spanish. It is thought by some that the Virginia varieties do not contain enough oil, while the Spanish peanuts contain too much. For this reason a mixture of the two types is used.

As the peanuts come from the farms they are mixed with considerable dirt and trash, which must be removed before they are ready for the market. After cleaning, the shelling stock of the large-podded varieties of the Virginia type is separated from that to be sold in the shell. Peanuts of this type always include a small percentage of pods that have been damaged or discolored in the field. These, together with the pods that become broken in handling, are used for shelling. Of the Spanish and Valencia varieties the greater portion is shelled, since these varieties are not popular as roasted peanuts.

The Valencia peanut makes butter of excellent quality, but as this variety is grown on a very small scale its use is necessarily limited. The reason the Valencia is not cultivated to any great extent is that it is difficult to harvest because the nuts pull off in digging.

Three grades of shelled peanuts are usually produced in the shelling factory, these being known as Nos. 1, 2, and 3. The No. 1 consists of the perfect, unbroken kernels, the No. 2 of split and broken kernels, and the No. 3 of the finely broken kernels and the small shriveled peas known as "pegs." Only the No. 1 and No. 2 grades of shelled peanuts should be used in the manufacture of peanut butter. The third grade makes an inferior product, which is unfit for human consumption.

### FACTORY AND EQUIPMENT.

In selecting a location for a peanut-butter factory the transportation facilities, labor supply, and proximity to the raw material and to consuming centers should be considered. The factory building should

be located near a railroad line, so that a spur track or siding can be used for loading and unloading materials and supplies without having to haul them on wagons or trucks. The labor supply requires special attention, as women are used more than men in a peanut-butter factory, and unless there is work in the community for their husbands and fathers it is difficult to secure sufficient help.

It is not necessary that the factory be located in a peanut-growing region, although such a location has some advantages. It is probably more important to be near the principal consuming centers, which are nearer the sources of supply of equipment, fuel, and accessories, such as bottles and jars. A factory located near a large consuming center has a longer haul for the raw product but a shorter haul for a large part of the finished article than the factory in the peanut-producing region. However, it would be economy for the consumers in the peanut-growing sections to be able to get their supply without having to pay transportation charges for long hauls to and from the factory. In other words, sufficient peanut butter should be made in the producing regions to supply the consumers in those regions.

The model peanut-butter factory consists of a four or five story building equipped and arranged for convenience and economy in handling the materials. The building should be light and airy and especially designed for good sanitation. Some small factories have all the equipment on one floor, but this necessitates considerable trucking back and forth, as a gravity system can not be used in delivering the goods from one machine to another.

The equipment of a peanut-butter factory consists of roasters, blanchers, picking tables, grinders, bottle-filling, capping, and labeling machines, and the necessary boilers to run the machinery, together with elevator, chutes, and suitable facilities for storing, packing, and shipping the raw material and the finished product.

Probably the ideal arrangement in a 4-story building is to have the roasting machinery and the stock of raw peanuts on the top floor; the blanching machinery and picking tables on the third floor; the grinders, bottling machines, and capping machines on the second floor; and the storage, packing, and shipping departments on the first floor. In this arrangement the materials come from the top floor to the bottom floor by gravity with the minimum of hand work required in carrying them from one machine to the other.

As most peanut-butter manufacturers secure shelled goods from cleaning and shelling factories, the cleaning and shelling processes will not be discussed here.

### ROASTING.

In the manufacture of peanut butter from shelled nuts the roasting is the first operation, and in an ideal factory this is done on the top floor. The roasting machinery is made especially for the purpose,

but is similar to that used in coffee roasting. Figure 1 shows the roasting machinery and equipment used in a good factory. In some factories the peanuts are elevated to a hopper over the roaster and are fed by gravity through a chute into the end of the roasting drum.

After the roasting is completed the peanuts are dumped from the drum into a hopper with perforated bottom and sides. This hopper is built on a truck which can be moved up to the roaster to receive the nuts and then moved back for the cooling. The cooling is accomplished by drawing currents of air through the peanuts and through the side or bottom of the hopper by means of a suction fan.

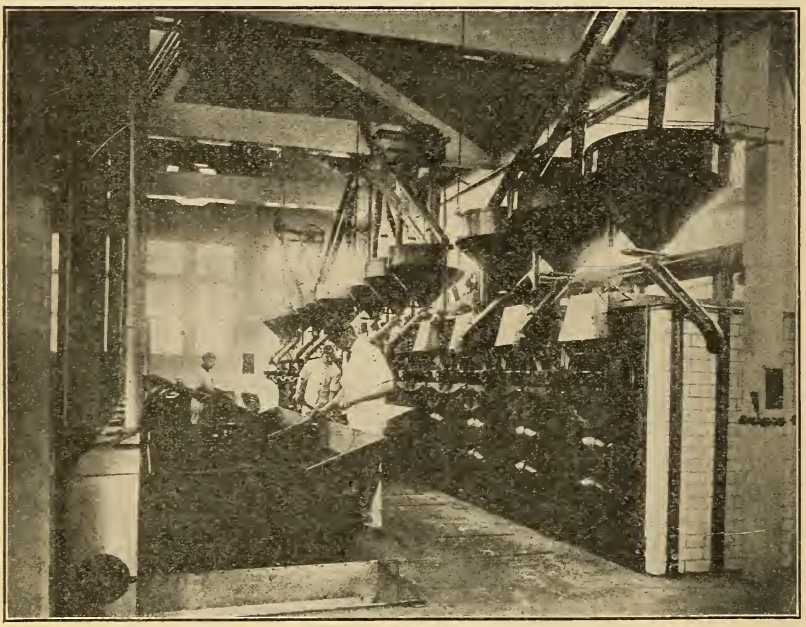

FIG. 1.—Roasting and cooling equipment in a model peanut-butter factory.

In some factories natural gas is used for fuel, while in others artificial gas, coal, or coke is employed. The temperature is more easily controlled where gas is used. The length of time required for roasting peanuts varies with the temperature and the class of goods used. When the peanuts are fresh, early in the season, it requires a longer time for the roasting process than when the peanuts have become thoroughly dried.

The temperature should not be high enough to scorch the peanuts. About 320° F. is considered right for shelled nuts, and at this temperature it requires 40 minutes to an hour to roast a batch. However, the state of roasting must be determined by the judgment and experience of the operator. As a rule, peanuts for butter are not subjected to as heavy a roast as is required for salted peanuts or

peanuts roasted in the shell. If the roasting process is carried too far the butter has a dark brown color and a burned taste. Peanuts that have had a mild roast are considered more palatable and more wholesome than those that have been overroasted. On the other hand, underroasted nuts make a butter lacking flavor and color, which does not keep as well as that made from peanuts that have been properly roasted.

### BLANCHING.

After the peanuts have been roasted and cooled they are ready to be blanched. In modern factories they are dumped from the cooling

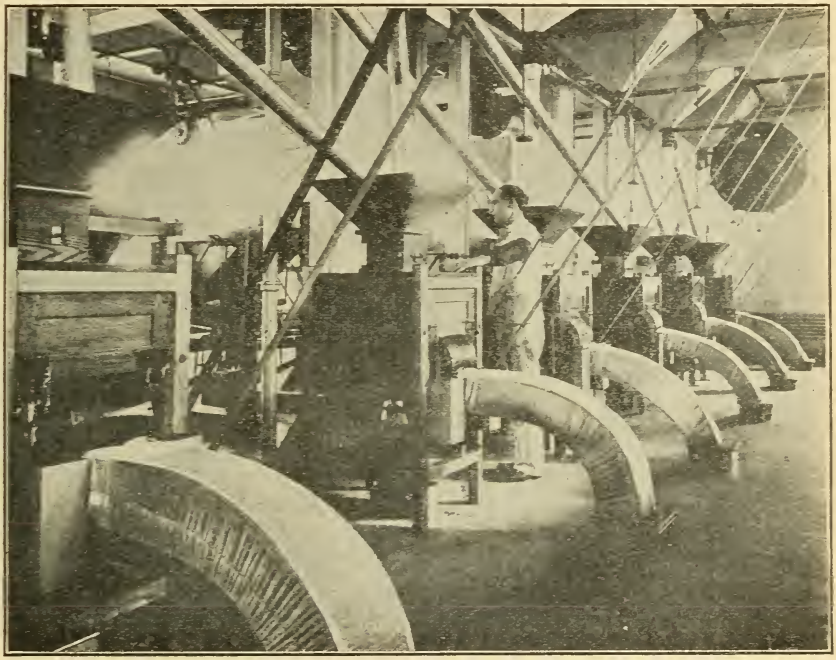

FIG. 2.—A type of blanching machine used in some peanut-butter factories. These machines remove the red skins and loosen most of the germs.

hoppers into chutes, from which they are fed into the blanching machines.

The blanching consists of removing the red skins, or seed coats, and is accomplished by machines made especially for this purpose (fig. 2). These machines have brushes which revolve against a corrugated plate. The blanching splits most of the peas into halves and loosens many of the germs, or "hearts." After passing between the corrugated plate and the brushes the meats pass over a screen and in front of a fan. The fan blows out the skins and some of the fine particles of meal, while the germs fall through the holes in the wire screen.

In order to get a high-grade butter it is necessary to remove the skins and a large portion of the germs. The skins show in the butter as red specks and give it a slightly bitter taste. The germs cause the butter to turn rancid sooner than when they are not present. The germs and red skins are sold as feed or to oil mills, which press out the oil and dispose of the resulting cake or meal for stock feed.

### HAND PICKING.

No matter how carefully the cleaning and grading are done in the cleaning and shelling factory, some hand picking is necessary in the peanut-butter factory. The blanched meats usually pass from the

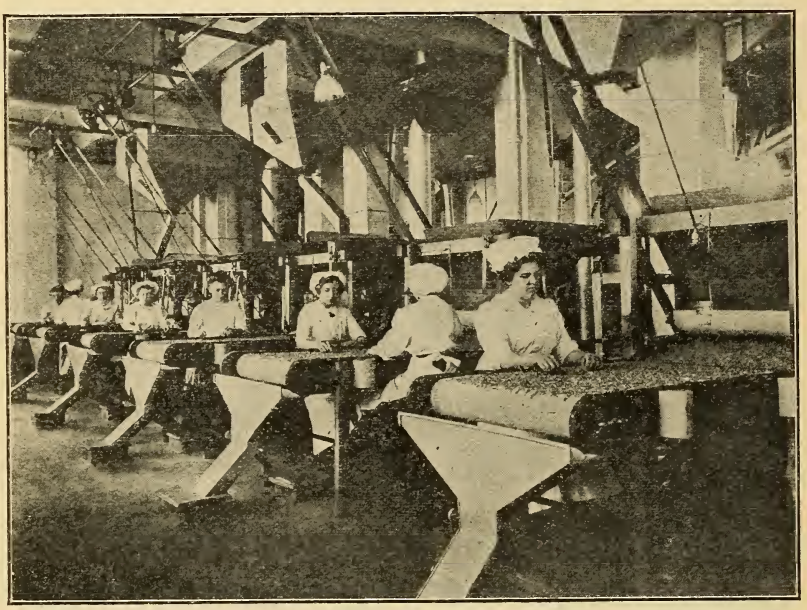

FIG. 3.—Picking tables used in a peanut-butter factory. The peanuts after being roasted and blanched pass over these tables, and women remove foreign particles and all unblanched and discolored pieces of nuts.

blanching machines to the picking tables, alongside of which are seated women who pick out any unblanched or discolored nuts and any foreign matter present. In one factory the blanched meats pass over a screen at the end of the picking table in order to sift out any germs that have been loosened after the material has left the blanching machine. After passing over these screens the meats move along on wide canvas belts, similar to those shown in figure 3. As they pass along women pick out the material which would lower the quality of the butter or detract from its appearance. These women are sometimes paid on the basis of the number of pounds of material picked out.

From the picking tables the meats fall into chutes which carry them to hoppers over the grinding machinery.

In some factories a mechanical stoner is used to remove small pebbles or pieces of stone which were not removed in the sorting process in the cleaning factory and also escaped the hand pickers.

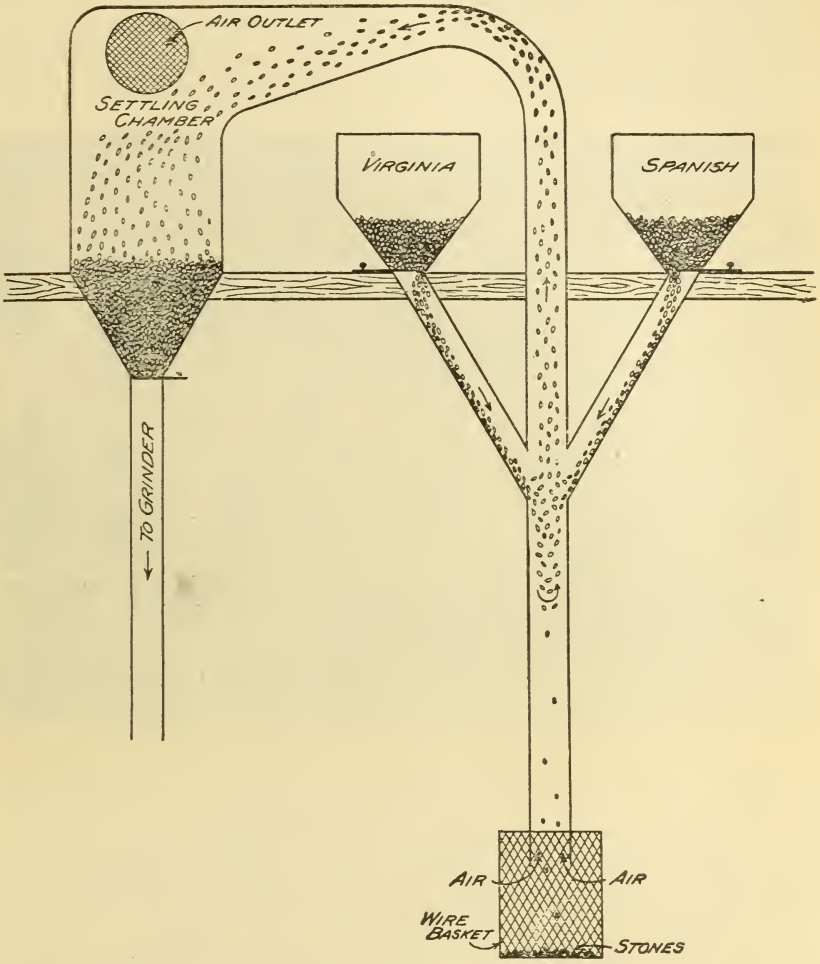


FIG. 4.—Sketch showing a device used for removing stones from the cleaned peanut meats.

The stoner works upon a gravity basis. The peanuts, being lighter than the stones, are drawn upward by a suction blast and the stones drop into a receptacle, as shown in figure 4. The removal of the stones is very important, as they injure the grinding machine and lower the quality of the butter. Consumers naturally object to peanut butter that is gritty.

### BLENDING.

When two grades or kinds of peanuts are used in making butter they are usually blended as they are fed into the hopper above the grinder. In one factory the blending is done in the stoner, two streams being fed side by side and blended by an air blast, as illustrated in the drawing, figure 4.

While some factories use only one variety, other use a mixture of Virginia and Spanish peanuts. One factory uses three parts Spanish to one of Virginia, while others use different proportions of these

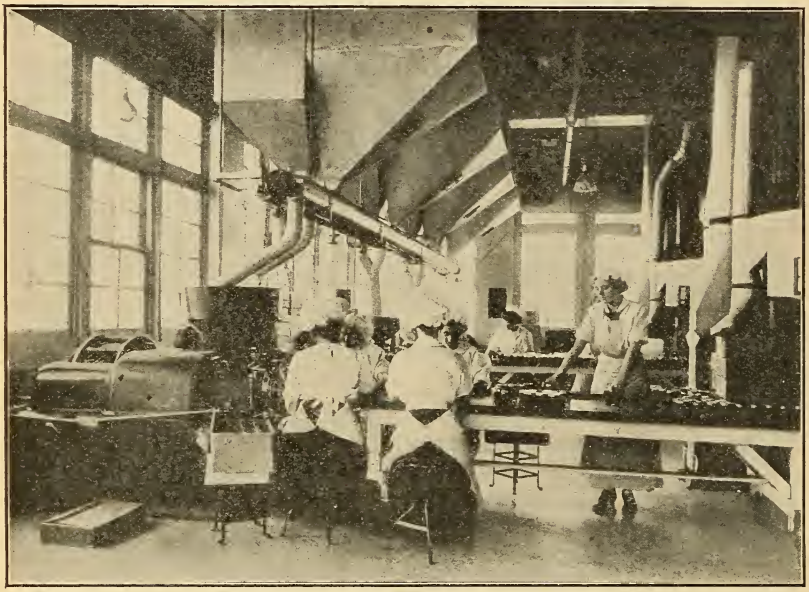

FIG. 5.—A section of a peanut-butter factory, showing a grinding and bottling machine (at the left).

two types. The uniformity of the product where two varieties are used depends upon the completeness of the blend.

Virginia peanuts when used alone make a product lacking in smoothness unless very finely ground, but by the addition of Spanish stock the consistency is materially improved. The Spanish variety used alone makes a very smooth product but is rather too oily. A better grade of peanut butter will be produced by the proper blending of the Spanish or other variety containing a high percentage of oil with another variety having a lower oil content.

### GRINDING.

Commercial manufacture of peanut butter requires the use of special machinery for grinding the nuts. The butter should be brought to a fine granular form rather than a pasty consistency.

When ground too fine the butter sticks to the roof of the mouth and when too coarse it has a gritty feel, which is objectionable. The aim in grinding peanut butter should be to break the oil cells apart rather than crush them. Worn or smooth grinding plates when run closely together do not give good results, because the rubbing of the butter between them makes a pasty product which allows the oil to settle out.

The grinding process produces considerable heat by the rubbing together of the plates, and great care is necessary to prevent heating the butter. Some grinders have the working parts surrounded

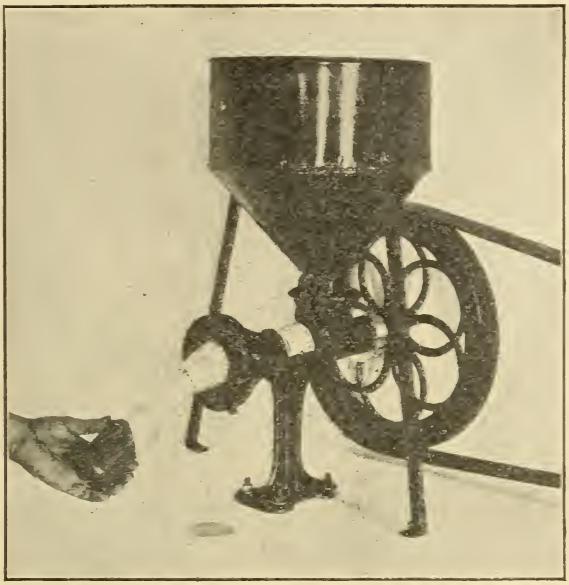

FIG. 6.—A small peanut-butter grinder used in small factories.

by a water jacket, and by circulating water through this jacket the temperature can be controlled.

Large peanut-butter factories use large grinders similar to the one shown in figure 5, run by a 30-horsepower motor that will grind as much as 20 pounds of meats per minute. The small factories use machines, similar to the one shown in figure 6 but of less capacity. While the small machines do not have so great a tendency to become overheated, care must be taken to run them at a moderate speed or to allow them to cool occasionally.

Before the peanut meats are ground a small quantity of high-grade dairy salt is usually added. The proportion of salt varies from 1½ to 3 per cent by weight. Sometimes the salt is mixed with the peanuts before they reach the hopper of the grinder, but some grinding machines are fitted with a small auxilliary hopper from which the salt is fed into the machine with the peanuts by means of a worm

or screw. It is very important to have the salt uniformly distributed through the butter.

Some manufacturers put their product on the market without salt or with only a small amount, as many persons prefer it with little or no salt.

### BOTTLING AND PACKING.

Peanut butter is put on the market in glass bottles, glass jars, tin cans, pails, tubs, and barrels. Most of the retail trade is supplied with butter in bottles or in small glass jars.

The bottles or other containers are often filled directly from the spout of the grinder, but sometimes from a separate filling machine. When the butter is transferred from the grinder to a filling machine this should be accomplished by means of a closed conveyor rather than in open tubs or pails. When tubs or pails are used they should be kept covered, so as to keep out particles of dust and dirt that may be in the air. Another method is to have the grinding machines upon a raised platform, discharging directly into the filling machine. The only advantage in using a filling machine is to get the butter more thoroughly mixed, but that is not necessary with up-to-date grinders, especially when these are equipped with the auxiliary hopper for the salt. In filling either from the grinder or from the filling machine the container should be filled directly from the spout. The bottles and glass jars usually are filled from the bottom, the operator holding the container against the spout with sufficient pressure to prevent the formation of air bubbles.

The containers when filled should be sealed in order to prevent the butter from spoiling or getting dirty. In some factories where glass jars are used, the sealing is done in a vacuum chamber. The lids are put on and the jars are placed on trays which are pushed into the chamber, where the air is drawn out.

It should be borne in mind that rubber packing or rubber rings will not be satisfactory, as the oil in peanut butter will dissolve the rubber. Either paper or some compound which is not attacked by the oil should be used for sealing the jars.

When pails or tubs are used for packing peanut butter they are provided with wood or metal covers held in place with wire, strips of metal, or nails, no attempt being made to make them air-tight. Large containers are not satisfactory for peanut butter except for hotels, restaurants, or other establishments using large quantities of the product. For the individual consumer or for the small family small containers are more satisfactory, because the butter can be used before it deteriorates. The principal objection to the sale of bulk peanut butter is the fact that the containers are frequently left uncovered in the stores and the contents exposed to dust, dirt, and insects. Unless the butter is sold within a short time it may become rancid when exposed to the air.

Where peanut butter is put in bottles or glass jars these are usually packed in wooden boxes or pasteboard cartons holding one, two, or three dozen. The jars used should be clear and white, as glass of a greenish tint will give the best peanut butter an inferior appearance.

Dealers handling peanut butter in bulk should bear in mind that the oil has a tendency to rise to the top. In order to have a uniform product it is desirable to stir the butter frequently with a wooden paddle. Consumers often complain that oil rises to the top of peanut butter in glass jars. When this happens it is only necessary to mix the oil thoroughly with the remainder of the contents by stirring with a spoon or knife.

### HOME MANUFACTURE OF PEANUT BUTTER.

From what has been said about the commercial manufacture of peanut butter it is evident that the process is very simple. Usually nothing is taken from the peanuts except the germs and red skins, and nothing is added except a small quantity of salt. Many persons have the idea that peanut butter consists of ground peanuts mixed with oil. As shelled peanuts contain from 13 to 50 per cent of oil, depending on the variety, it would be unnecessary to add oil. The only difference between ground peanuts and peanut butter is in the fineness of the particles.

A cheap wholesome peanut butter can be made at home by means of an ordinary meat grinder. Raw unshelled or raw shelled peanuts can be bought from dealers and roasted in the oven at home, or peanuts that have been roasted can be obtained. When roasting peanuts in the oven care should be taken to prevent burning. The nuts should be stirred from time to time in order to get a uniform roast. Greater care is necessary in roasting shelled than unshelled nuts, as the former are more easily scorched. By examining the peanuts from time to time during the process the desired degree of roasting can be given.

When unshelled peanuts are used they should be roasted in the shell and cooled. After cooling they should be shelled and blanched. The blanching can be accomplished by rubbing the meats over a wire-bottom screen. This rubbing removes the red skins and loosens the germs. If the screen has holes of the proper size the germs can be sifted out. The meats can be readily cleaned by pouring them from one vessel to another in the open, where the wind will blow out the skins.

After the meats are cleaned they are ready for grinding. The salt may be added before or after grinding. A good type of meat grinder is satisfactory for grinding the peanut meats provided the burrs are not worn. The finest burrs should be used and the machine should be set to grind the meats as fine as possible. If the butter is not fine enough after running it through the machine once, it should be put

through again. When salt is not added to the nuts before grinding them it is advisable to add it to the paste before the second grinding.

In order to be sure of a good grade of peanut butter it is best to make it often rather than to make a supply which will last for several months. When made at home the actual cost of peanut butter is much less than the price paid in the stores; in fact, it should not exceed 15 or 20 cents a pound, which is a very low price for a product of such high food value.

## USES OF PEANUT BUTTER IN COOKERY.

The Office of Home Economics of the United States Department of Agriculture,[1] which has studied the digestibility and food value of peanuts, peanut oil, and the flour made from the pressed cake, along with methods of preparing these products for food, has supplied the following recipes for the use of peanut butter.

### Peanut-Butter Sandwich Cream.

Perhaps the best known use for peanut butter is as a sandwich filling. The butter may be used as it comes from the jar, but many prefer to thin it with a little cream or other liquid. This sandwich filling is delicious.

1 cup milk.
1 tablespoon flour.
1 tablespoon water.
1 egg.
1 cup peanut butter.
1 teaspoon salt.
¼ teaspoon paprika.
2 tablespoons vinegar.
½ cup chopped stuffed olives.

Heat the milk in a double boiler. Blend the flour, water, and peanut butter to a smooth paste, add salt and paprika, and the egg beaten slightly. Mix with the hot milk and cook for 5 minutes in the double boiler. Add the chopped olives and vinegar. Cool and spread on sandwiches.

Make only the quantity needed for immediate use, as this sandwich cream does not keep well.

### Peanut-Butter and Raisin Sandwich.

Spread a slice of bread thickly with peanut butter and place on top of it a layer of seeded raisins.

### Peanut-Butter Salad Dressing.

½ cup sour cream.
2 tablespoons peanut butter.
2 tablespoons vinegar.
1 egg.
½ tablespoon sugar.
½ teaspoon salt.
¼ teaspoon mustard.
⅛ teaspoon paprika.

Mix and cook in a double boiler until thickened.

### Peanut-Butter Canapes.

Cut rounds of bread and toast to a delicate brown.

Mix peanut butter with cream cheese, add salt, spread lightly on the toasted rounds and serve.

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[1] Holmes A. D. Digestibility of some seed oils. U. S. Dept. Agr. Bul. 687, p. 20. 1918.
Use peanut flour to save wheat. U. S. Dept. Agr., Off. Sec. Cir. 110, p. 4. 1918.
Thompson, H. C. Present status of the peanut industry, U. S. Dept. Agr. Yearbook for 1917; Sep. 748, 16 p., 5 pl. 1918.
Holmes, A. D. Digestibility of proteins supplied by soy-bean and peanut pressed cake flour. U. S. Dept. Agr. Bul. 717, p. 28. 1918.

### Tomato and Peanut Soup.

1½ cups stewed and strained tomatoes.
½ cup peanut butter.
1 teaspoon salt.
¼ teaspoon paprika.
2½ cups boiling water.

Add tomatoes gradually to the peanut butter and when smooth add the seasonings and water. Simmer for 10 minutes and serve with croutons. Well-seasoned soup stock may be substituted for the water; but, if used, the quantity of salt should be reduced.

### Rice-Water and Peanut-Butter Soup.

When rice is cooked in a large quantity of water the water drained from it may be used as a basis for soup. To 1 pint of rice water add 2 tablespoons of peanut butter, ½ teaspoon of onion juice or chopped parsley, and salt. Blend and serve hot.

Or, in place of the rice-water stock, make a thin white sauce and add the peanut butter to it.

## Meat-Substitute Dishes.

Peanut butter makes a good meat substitute, since, like meat, it contains both protein and fat.

### Scalloped Rice with Peanut-Butter Sauce.

2 cups milk.
2 tablespoons flour.
6 tablespoons peanut butter.
2 teaspoons salt.
2 teaspoons onion juice.
2½ cups cooked rice.

Blend the flour and the peanut butter with a little cold milk. Add to the hot milk with the seasonings. Cook until it thickens. Put a layer of rice in a baking dish and cover with a layer of the peanut sauce. Repeat until the dish is full. Bake in oven for 20 minutes.

### Peanut-Butter Loaf.

2 cups bread crumbs.
1 cup cooked rice.
½ cup chopped stuffed olives.
¼ teaspoon celery salt.
½ cup peanut butter.
1 teaspoon onion juice.
2 teaspoons salt.
2 eggs.
½ cup milk.

Mix the ingredients and form into a loaf. Bake until brown. Serve with a tomato sauce.

### Peanut-Butter Omelet.

4 eggs.
4 tablespoons milk.
6 tablespoons peanut butter.
1 teaspoon salt.

Mix the peanut butter with the milk. Separate the whites and yolks of the eggs and beat well. Blend milk with the beaten yolks and fold in the beaten whites. Brown the omelet and fold. Serve on a hot platter with a cream or tomato sauce.

### Peanut-Butter Fondue.

3 eggs.
6 tablespoons peanut butter.
¾ cup milk.
1 teaspoon salt.
1 cup dry bread crumbs.

Blend the peanut butter with the milk and add the beaten yolks and the bread crumbs. Fold in the stiffly beaten whites. Pour into a baking dish or individual baking cups, surround with hot water, and bake until firm.

### Peanut-Butter Bread and Cookies.

Peanut butter is also good in various hot breads or in cookies. When used for such purposes the fat specified in the recipe may be greatly reduced or the peanut butter in some cases may entirely replace it; for instance, in baking-powder biscuits, peanut butter may be used in place of other fat.

#### Parched Corn-Meal Biscuits.

½ cup yellow corn meal.
1 teaspoon salt.
1 cup peanut butter.
1½ cups water.

Put the meal into a shallow pan and heat in the oven until it is a delicate brown, stirring frequently. Mix the peanut butter and water, add salt, and heat. While the mixture is hot, stir in the meal, which also should be hot. Beat thoroughly. The dough should be of such consistency that it can be dropped from a spoon. Bake in small cakes in an ungreased pan. This recipe makes 16 biscuits, each of which contains one-sixth ounce of protein.

#### Peanut-Butter Salad Wafers.

1 cup corn meal.
1 cup wheat flour.
½ cup peanut butter.
1 teaspoon salt.
½ cup milk.

Mix together, roll out very thin, and cut out. Bake in a moderate oven until brown.

#### Oatmeal-Peanut-Butter Drop Cookies.

½ cup sugar.
¼ cup sirup.
8 tablespoons peanut butter.
¾ teaspoon salt.
2 eggs, well beaten.
2½ cups rolled oats.

Mix together and drop by the spoonful on a greased baking sheet. Bake until brown.

#### Peanut-Butter Cake Filling.

½ cup sirup.
1 tablespoon vinegar.
¼ teaspoon salt.
2 tablespoons peanut butter.
The white of 1 egg.

Cook the sirup with the vinegar until it forms a hard ball when dropped in cold water. Pour over the beaten egg white and beat until stiff. Add the peanut butter the last thing. Spread between the layers of a simple 1-egg cake or sponge cake. Serve with a fork.

It will be found in using peanut butter that individual tastes vary considerably. Those who are fond of the flavor may wish to increase the quantities of the butter specified in these recipes, while others may prefer to reduce them. It will be easy, however, for the housewife to adapt these recipes to the tastes of her family.

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